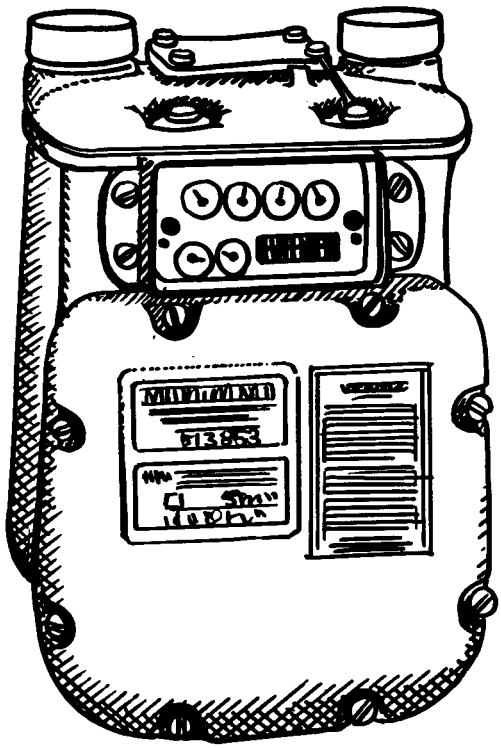
Extension Folder 387—1983

Fuel Prices and Heating Cost in Minnesota



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Residential Energy

Rising fuel prices, including electric rates, are the reason most people are beginning to conserve energy. Your decisions to conserve, particularly major home improvement investments or selection of a heating source, will be aided by knowing the official state forecasts of fuel prices. Table 1 gives the forecast for oil, LP gas, natural gas, and two versions of electricity purchase plans. Tables 2 and 3 show how to compare fuels for heating on a cost basis. Table 4, on page four, shows how to figure the amount of heat in standard units that is needed to keep your house comfortably warm.

a. From forecast issued by the Minnesota Department of Energy, Planning, and Development, March 31, 1982. State sales tax is included, but local taxes are not. Fuel prices in some localities will differ, so check with your supplier for current local prices. Table 1 is statewide average prices.
b. Prices are for fall of the year. For example, it is expected that natural gas will be 50¢ per hundred cubic feet when the 1982-83 heating season begins.
c. On-peak electricity rate is the typical price paid by most electricity users for appliances, lights, and water heaters. One utility, for example, charges base-rate for electricity up to 1000 KWH per month, then a lower rate for further electricity used in the same month.
d. Off-peak rates apply to electricity used at night, for example, from 11 PM to 7 AM. Check with your electricity supplier for their hours and price rates.

Table 1. Residential Price Projections[a]

Year[b]	Fuel Oil	LP-Gas	Natural Gas	On-Peak Electricity[c]	Off-Peak Electricity[d]
					(Approx)
	$/gal	$/gal	$/CCF	¢/KWH	¢/KWH
1981	1.15	.71	.40	5.19	2.60
1982	1.11	.71	.50	5.71	2.86
1983	1.22	.79	.58	6.05	3.02
1984	1.36	.89	.66	6.39	3.20
1985	1.50	1.00	.83	6.73	3.36
1986	1.66	1.13	.91	7.25	3.62
1987	1.82	1.24	1.00	7.67	3.84
1988	2.01	1.36	1.09	8.14	4.07
1989	2.20	1.48	1.17	8.59	4.30
1990	2.41	1.62	1.28	9.07	4.54
1991	2.64	1.77	1.41	9.72	4.86
1992	2.87	1.92	1.54	10.42	5.21
1993	3.12	2.08	1.67	11.15	5.58
1994	3.37	2.24	1.82	11.74	5.87
1995	3.65	2.42	1.97	12.35	6.18

gal = gallon
CCF = hundred cubic feet
KWH = kilowatt-hour
MBTU = million British Thermal Units

Table 2. Method for Figuring Cost Per MBTU (MBTU = Million British Thermal Units)

Type of Heating System	Fuel Units Used for Each MBTU Provided	×	Cost Per Fuel Unit	=	Cost Per MBTU
Oil/old design	10.0 gal	×	$____/gal	=	$____
Oil/high efficiency	9.0 gal	×	$____/gal	=	$____
Oil/theoretical	7.2 gal	×	$____/gal	=	$____
Kerosene/typical	11.4 gal	×	$____/gal	=	$____
Gas/standard	15.2 CCF	×	$____/CCF	=	$____
Gas/damper	14.0 CCF	×	$____/CCF	=	$____
Gas/power vented	12.5 CCF	×	$____/CCF	=	$____
Gas/recuperative	11.6 CCF	×	$____/CCF	=	$____
Gas/pulse	10.6 CCF	×	$____/CCF	=	$____
Gas/theoretical	10.0 CCF	×	$____/CCF	=	$____
Propane/standard	16.5 gal	×	$____/gal	=	$____
Propane/damper	15.3 gal	×	$____/gal	=	$____
Propane/power vent	13.6 gal	×	$____/gal	=	$____
Propane/recuperative	12.6 gal	×	$____/gal	=	$____
Propane/pulse	11.6 gal	×	$____/gal	=	$____
Propane/theoretical	10.9 gal	×	$____/gal	=	$____
Wood/open fireplace	0.5 cord	×	$____/cord	=	$____
Wood/airtight furnace	0.1 cord	×	$____/cord	=	$____
Electric	293.0 KWH	×	$____/KWH	=	$____
Electric heat pump	210.0 KWH	×	$____/KWH	=	$____

Abbreviations:

CCF = hundred cubic feet KWH = kilowatt-hour gal = gallon MBTU = million British Thermal Units

Footnotes/Explanations:

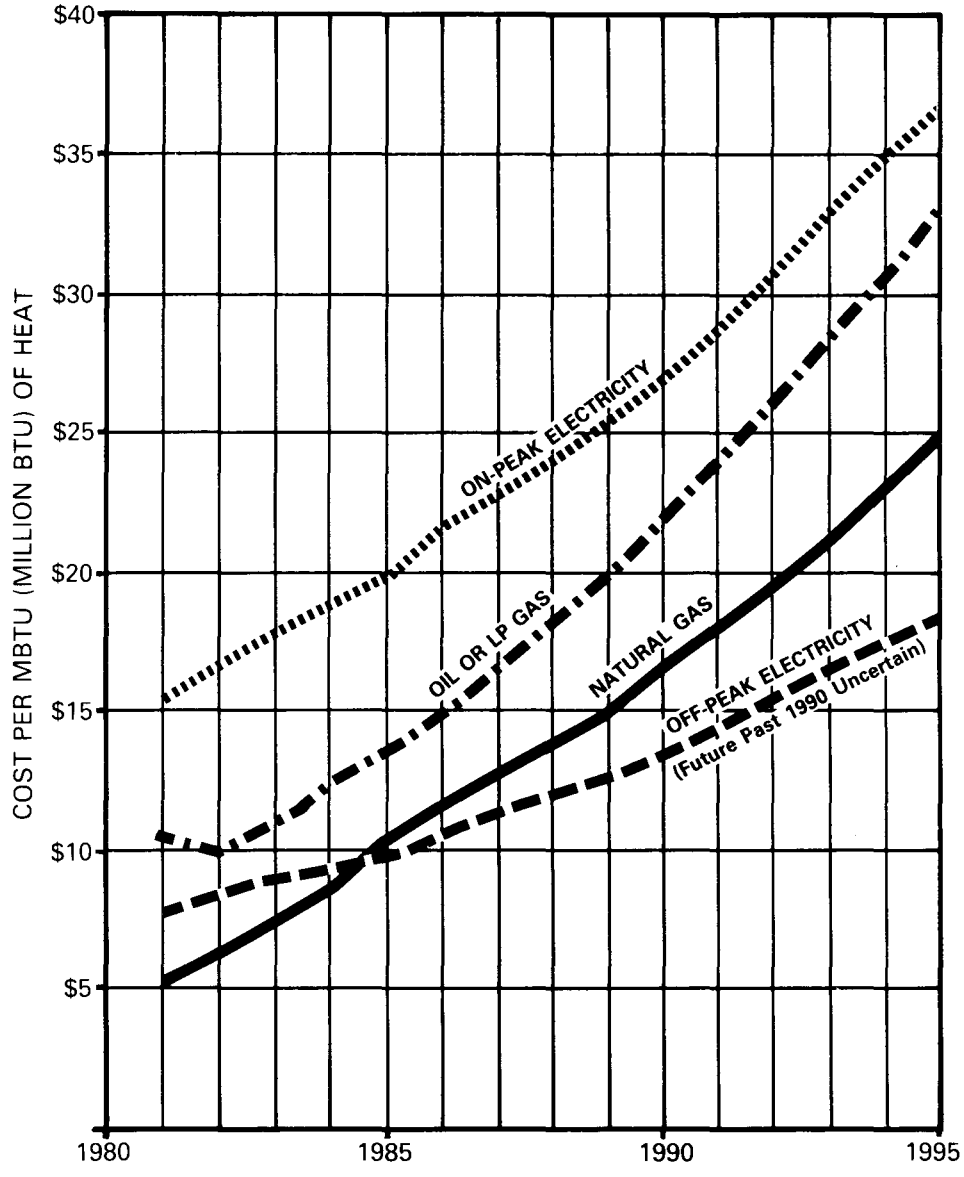
Column two, "fuel units used for each MBTU provided," is a seasonal average. Furnaces burn most efficiently during cold weather, but are less efficient during cool weather when they cycle on-off more frequently. A government approved rating, "AFUE" (Annual Fuel Utilization Efficiency), is now available on all furnaces. The relationship of "AFUE" to Table 2 is as follows:

$$\text{Fuel Units Used for Each MBTU Provided} = \frac{\text{Theoretical Fuel Units for Each MBTU}}{\text{AFUE}}$$

Furnace size may affect efficiency. For example, in pulse furnaces the smaller sizes have AFUE = 96%, whereas the largest size rates at AFUE = 91%. Table 2 has assumed a medium sized pulse furnace, AFUE = 94%. Furnace size is given by maximum heat output it can produce per hour, in other words "BTU per hour." It is recommended you install the smallest size possible.

Wood heating efficiency depends on the quality of the wood *and* the woodstove or furnace. Table 2 has assumed a cord of wood which weighs 3,000 pounds with a 20 percent moisture content (air dried for at least six months). A cord measures 4 ft × 4 ft × 8 ft, but may weigh anywhere from 1,800-5,000 pounds depending on type of wood and moisture content. For more information, obtain Extension Bulletin 436.

Table 3. Forecast Cost Per Million BTU of Heat (See Details Below)



Specified Furnace Efficiencies:

Oil (#2 Fuel Oil)	9.0	gallons	per MBTU
LPG	13.6	gallons	per MBTU
Natural Gas	12.5	CCF	per MBTU
Electricity	293.0	KWH	per MBTU

Year	Fuel Oil	LPG	Natural Gas	On-Peak Electric	Off-Peak Electric
1981	$10.35	$ 9.66	$ 5.04	$15.21	$ 7.62
1982	9.99	9.66	6.29	16.73	8.37
1983	10.98	10.74	7.26	17.73	8.85
1984	12.24	12.10	8.22	18.72	9.36
1985	13.50	13.60	10.38	19.72	9.86
1986	14.94	15.37	11.39	21.24	10.62
1987	16.38	16.86	12.46	22.47	11.23
1988	18.09	18.50	13.58	23.85	11.92
1989	19.80	20.13	14.62	25.17	12.58
1990	21.69	22.03	16.05	26.58	13.29
1991	23.76	24.07	17.59	28.48	14.24
1992	25.83	26.11	19.21	30.53	15.26
1993	28.08	28.29	20.92	32.66	16.33
1994	30.33	30.46	22.72	34.40	17.20
1995	32.85	32.91	24.62	36.18	18.09

Table 4. Fuel Amount Change Due to Installing New Furnace

1._____gal, CCF, or KWH's used for heating last heating season

2._____weather adjustment factor (see Folder 563, or for approximate purposes simply transfer your answer from line 1 to line 3)

3._____weather-adjusted fuel use (line 1 times line 2)

4._____gal, CCF, or KWH's needed to provide one MBTU with existing heating system (see column two of Table 2)

5._____MBTU of heat needed per heating season (line 3 divided by line 4)

6._____gal, CCF, or KWH's needed to provide one MBTU with new heating system (see column two of Table 2)

7._____fuel use predicted for new heating system, per season (line 5 times line 6)

8._____fuel saved per season* by installing new heating system (line 3 minus line 7)

9._____dollars saved per season (line 8 times price of fuel)

*If you might switch to a different fuel, figure the cost of old type fuel/old heating system versus new type/new heating system. Assume that the MBTU needed to keep your home comfortably warm is the same in each case.

For example, if you had an older oil furnace and burned 1,200 gallons of oil in one season, you could figure that your house needs 120 MBTU (1,200 gallons divided by 10 gallons per MBTU). Then you could continue to predict how much oil you would use if you installed a high efficiency oil furnace. Knowing that you need 120 MBTU of heat, and finding from column two that an efficient oil furnace would use 7.2 gallons per MBTU, you could predict that your seasonal use would be 864 gallons (120 $\times$ 7.2). This would be a savings of 336 gallons of oil per year. To be accurate in these calculations, you should work from a typical winter season, or adjust your fuel use accordingly (see Folder 563 for adjusting fuel use by degree-days of winter coldness).

The MBTU needed for a brand new home can be predicted. For assistance ask your county agent regarding "heat loss estimating," or your local housing inspector or code official.

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